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THE AMERICAN NATURALIST

VOL. XXIII.

DECEMBER, 1889.

276.

THE GIGANTIC LAND TORTOISES OF THE GALAPAGOS ISLANDS.

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IN 1877, Dr. A. Günther published his memoir on the Gigantic Land Tortoises (living and extinct) in the collection of the British Museum. The Galapagos Islands were found to be inhabited by six species. Of only three the exact localities were known: *Testudo abingdonii* Günther, from Abingdon Island; *T. microphyes* Günther, from North Albemarle, and *T. vicina* Günther, from South Albemarle. *T. ephippium* Günther was believed to be an inhabitant of Charles Island (in the synopsis, p. 11 of Indefatigable Island). *T. elephantopus* Harl. was attributed with query to James Island; no locality was given for *T. nigruta*, D. and B.

Having been occupied lately with the history of the Galapagos Islands, I have come across two works not mentioned by Dr. Günther, which are of the highest importance to this question. The first work is the "Voyage of the United States Frigate *Potomac*, under the command of Commodore John Downes, during the circumnavigation of the globe, in the years 1831, 1832, 1833 and 1834," by Z. N. Reynolds, New York, 1835. On pages 464-473, the Galapagos Islands are described. Only Charles Island was visited (Aug. 31 to Sept. 10, 1833). The *Potomac* returned to Boston, May 23, 1834. In June of the same year, two gigantic

Galapagos tortoises (living), weighing near three hundred and twenty pounds each, were presented by Captain John Downes, of the *Potomac*, to the Boston Society of Natural History.¹ These two tortoises formed the material for a very extensive paper on the anatomy of the Galapagos tortoises, by Dr. J. B. Jackson, which was printed in the first volume of the Journal of the Boston Society of Natural History, with two plates.² This is the second work overlooked by Dr. Günther. It is the best older scientific account of these tortoises. One of these specimens is still in the Museum of the Boston Society in form of a skeleton. The first thing to be done is to examine whether the two tortoises brought by the *Potomac* are really from Charles Island. As stated before, the *Potomac* visited only this island. In the appendix of Reynolds' book we find the following important note, p. 547.

"A large number of the crew were daily on shore after terrapin, and frequently exposed throughout the day to a hot sun, with these immense animals on their backs, travelling over the broken lava." This note proves, I think, that the two tortoises donated by the captain of the *Potomac* to the Boston Society were really from Charles Island. Besides that I believe that Darwin's remark in his journal, that on Charles Island the crew of a certain frigate took down to the shore 200 tortoises on a single day, some years before his visit in 1835, refers to the *Potomac*. Through the kindness of Prof. A. Hyatt I have received for examination five skulls of Galapagos tortoises, among which is the skull of one of the animals presented by Captain Downes, and described by Dr. Jackson. This skull is different from any one described by Dr. Günther. It agrees exactly with three smaller skulls received for examination through the kindness of Prof. A. Heilprin from the Philadelphia Academy.

After this it is evident that the *T. ephippium* of Günther supposed to be the form from Charles Island, must have another locality. The question is, From which Island? The type of *T. ephippium* is an adult male, thirty-three inches long, stuffed, and

¹ Jour. Bost. Soc. Nat. Hist., I., 1834-1837, p. 521.

² J. B. Jackson, M. D., Anatomical Description of the Galapagos Tortoise. Read Feb. 1, 1837. Jour. Bost. Soc. Nat. Hist., I., 1837; pp. 443-464, Pl. X., XI.

"belongs to the Museum of Science and Arts, Edinburgh." According to Dr. Günther nothing is known of its history. *T. ephippium* very much resembles *T. abingdonii* not only in the shell, but also in the skull and the slender fore-limb, and it seems to me that it really represents this species. Some notes in Captain Basil Hall's Journal,³ which were omitted by Dr. Günther, give a very strong support to this belief.

Captain Basil Hall visited the Galapagos Islands in January, 1822. On Abingdon Island, the only island visited, experiments were made with an invariable pendulum. Speaking of the tortoises, Captain Hall says: "We took some on board, which lived for many months, but none of them survived the cold weather off Cape Horn. I preserved one in a cask of spirits, *and it may now be seen in the Museum of the College at Edinburgh*: it is about the medium size." (Italics are mine.) The following measurements of a tortoise weighing 190 pounds are given.

	Inches.
"Length of upper shell, ...	43
Breadth of ditto, ...	44 $\frac{1}{2}$
Length of belly shell, ...	29
Breadth of ditto, ...	26
Length of the head, ...	6 $\frac{1}{2}$
Greatest breadth, ...	4 $\frac{1}{2}$
Ditto depth, ...	3 $\frac{3}{4}$
Greatest extent of upper and lower mandible, .	3 $\frac{3}{4}$
Distance of eye from nose, ...	1 $\frac{2}{3}$
Length of neck, ...	31
Circumference about the middle of the neck, .	9
From fore part of upper shell to the fore part of belly shell, ...	11 $\frac{1}{2}$
From after part of upper shell to the after part of belly shell, ...	7
Length of fore-leg and thigh, ...	22 $\frac{1}{2}$
Circumference above the foot, ...	8 $\frac{3}{4}$

³ Captain Basil Hall, Extracts from a Journal written on the coasts of Chili, Peru, and Mexico, in the years 1820, 1821, 1822. Part II. London, 1840. (Orig. Ed., Edinburgh, 1824.)

	Inches.
Length of hind leg and thigh, ...	24
Circumference above the foot, ...	16
Length of tail, ...	8½
Depth of upper shell when scooped out, . .	17
Width inside, ...	27
Number of pieces composing the disk, . .	13
Number of pieces in the margin, ...	24
When alive weighed, ...	190 lbs.
Quantity fit for use, ...	84 lbs."

Is it not probable that the specimen now in the Edinburgh Museum of Science and Arts is the one collected by Captain Hall in 1822, and therefore from Abingdon Island?

Thinking it possible that something about the history of *T. ephippium* could be found out, I wrote to the Director of the Edinburgh Museum of Science and Arts, in which the type is preserved, asking whether anything is known about this specimen. Dr. R. H. Traquair had the great kindness to examine the matter and wrote to me: "I have to say that I have had the records of the old College Museum searched for information as to the specimen of *Testudo ephippium* figured and described by Dr. Günther, and the only entry which we can find which can possibly have any reference to that specimen is one in the year 1822-23 of a 'Large Turtle from South Sea—Captain Basil Hall.' Now in those old days, when the Museum was under the charge of Professor Jamison, no marks were put upon the specimens by which they could be afterwards identified with entries in the register! Consequently we have no *absolute* certainty as to whether our *Testudo ephippium* is the specimen from the 'South Sea' presented by Captain Basil Hall or not."

From these notes and from a comparison of the descriptions of *T. ephippium* and *T. abingdonii*, I reach the conclusion that *T. ephippium* is the same species as *T. abingdonii*, and that the type specimen of the former is the one brought by Captain Hall from Abingdon Island. The name *T. ephippium* has the priority, but I

think that the name *T. abingdonii* ought to be selected, as more significant.⁴

After excluding *T. ephippium* we have six species left inhabiting the Galapagos Islands :

1. *T. elephantopus* (Harlan) Günther.
2. *T. nigrata*, D. and B.
3. *T. vicina*, Günther.
4. *T. abingdonii*, Günther.
5. *T. microphyes*, Günther.
6. The specimen from Charles Island in the Museum of the Bos. Soc. Nat. Hist., called *T. elephantopus*, Harlan, by Jackson.

Through the great kindness of the Secretary of the Academy of Natural Sciences, in Philadelphia, I have received permission to examine the type specimen of Harlan. It was in a very bad condition. The skin of the neck was all decayed, and also different parts on the limbs. The best possible thing to do was to save everything of the skin that could be saved and prepare a skeleton of the specimen. Fortunately all parts of the skeleton were found with the exception of the hyoid bones and both femora.

The comparison of the skull of the type and the skull of the specimen from Charles Island showed at once that they belonged to two different species. A further comparison of the type of *T. elephantopus* with the description of the specimens in the British and other English Museums (by Dr. Günther) regarded as this species, led to the conclusion that Günther's *T. elephantopus* is a different species from the type.

The next question is, Is it possible that any of the other species

⁴ Since the above was written, I had opportunity, through the kindness of Prof. Brown Goode, to examine a nearly complete specimen of *T. abingdonii* in the U. S. National Museum, which was collected by the steamer *Albatross* on Abingdon Island. It is an old male. This specimen is of great importance, since it contains the elements missing in the British Museum specimens. A comparison of these with the corresponding ones of *T. ephippium* leaves no doubt that *T. abingdonii* is not different from *T. ephippium*. I take the opportunity to express my best thanks to Mr. F. A. Lucas, of the U. S. National Museum, for many services offered in connection with the examination of these tortoises.

described by Dr. Günther is referable to the type specimen of *T. elephantopus* Harlan.⁵

According to these statements we have the following synonymy:

1. *Testudo elephantopus* Harlan = *T. vicina* Günther.
2. *Testudo spec. nov.* = *Testudo elephantopus* Jackson, non Harlan.
3. *Testudo spec. nov.* = *Testudo elephantopus* Günther, non Harlan.
4. *Testudo abingdonii* Günther = *T. ephippium* Günther.
5. *Testudo nigrita* D. and B.
6. *Testudo microphyes* Günther.

For the species from Charles Island, described by Jackson, and now in the Boston Museum of Natural History, I propose the name *Testudo galapagoensis*; for the species described by Günther as *T. elephantopus*, the name *Testudo güntheri*, in honor of Dr. A. Günther of the British Museum, to whom we owe much of our knowledge of the gigantic Land Tortoises.

I follow Dr. Günther in disusing the name *Testudo nigra* proposed by Quoy and Gaimard in 1824 for a young specimen, since it is impossible to decide at present which of the species proposed later is referable to this species. The exact locality of this specimen being unknown, I think it will always be impossible to settle the question.

The Fish Commission steamer *Albatross* brought about fifteen living specimens of tortoises from the Galapagos Islands, but unfortunately the exact localities were not known. Some of them were said to be from Duncan Island, from which no tortoises had been recorded.⁶

Land tortoises have been recorded from Hood Island by Delano, Porter, and Cookson, but no specimens have been examined.

⁵ A number of specimens collected by the *Albatross* agree exactly with the type of *T. elephantopus* Harlan and the *T. vicina* of Günther.

⁶ A party of the Italian steamer *Vettor Pisani* visited Duncan Island in 1885, "um Schild-Kröten zu fangen, konnte jedoch, obschon verschiedene die man bis auf 80 Pfundschätzts gesehen den war keine erbeuten," *Illustr. Zeitschrift für Länder. Und Völkerkunde Globus*, Vol. XLIX., No. 6, 1886, p. 93. It is not possible to decide whether these tortoises were land or sea tortoises.

What we know to-day is the following: The tortoise of Charles Island is with very little doubt extinct. The only authentic specimen brought from this island is now in the Boston Museum of Natural History, and is the type of *Testudo galapagoensis*. *T. abingdonii* (*eplippium*) the tortoises from Abingdon Island, seem to be very much reduced, perhaps extinct.

The tortoises on Albemarle are still numerous. The northern form is *T. microphyes*, the southern form *T. elephantopus* Harlan (*T. vicina* Günther). The localities of *T. güntheri* (*T. elephantopus* Günther) and *T. nigrita* D. and B. are not known; but, since tortoises have been recorded from Chatham, Indefatigable and James Islands, they belong to one of these; but the future must decide to which special island. Perhaps this question can still be decided, if the tortoises have not become entirely extinct on these islands, which I do not suspect.

Whether the tortoises said to be on Duncan Island belong to a new species, or one of the six known ones, is a question. The same is to be said of the tortoises inhabiting Hood Island. Nothing is known in regard to tortoises about Barrington, Burnloe and Tower Islands.

I fear that the history of the land tortoises of the Galapagos will never be solved; if it is to be, a scientific expedition must be sent out soon, with the object of making a full examination of each land of this group.

SOME OF THE OLDER ACCOUNTS OF THE LAND TORTOISES.

At the end of the seventeenth century the Galapagos Islands were frequently visited by buccaneers. Cowley, Wafer and especially Dampier have given accounts of these visits, and it was at this time that Cowley published a map of the islands. The first visit was in 1684 by Cowley, Cooke, Dampier and Edward Davis. They arrived the 31st of May. The following year Davis, Wafer, Knight and Harris were again there, and in 1687 Davis and Wafer made the third visit. Dampier was there at different times, and to him we owe the first account of the land-tortoises. "There is no place in the world," he says, "so much

stored with Guanos and Land-Tortoises as these Isles. The first are fat, and of an extraordinary size, and exceedingly tame; and the Land-Tortoises so numerous that some hundred men may subsist on them for a considerable time, being very fat, and as pleasant food as a pullet; and of such bigness, that one of them weighs 150–200 pounds, and are from two feet to two feet six inches over the belly, whereas, in any other places, I never met with any above 30 pounds weight, though I have heard some say, that at St. Lawrence or Madagascar there are also some very large ones." They "are in shape like the first, [Hackatee=*Chrysemys ornata*, Gray] with long necks and small heads, only they are much bigger." "The oil saved from them was kept in jars, and used instead of butter to eat with dough-boys or dumplings." "We lay here feeding sometimes on land-turtle, sometimes on sea-turtle, there being plenty of either sort; but the land-turtle, as they exceed in sweetness, so do they in numbers; it is incredible to report how numerous they are."

In June, 1700, the French captain de Beauchesne visited the Islands, but nothing is said in the Journals of his voyage about the tortoises, so far as I know.

The first good account of the tortoises was given by Woodes Rogers, who was on the Islands in September, 1707.

"Some of the largest of the Land-Turtles," he says, "are about 100 pounds weight, and those of the sea upwards of 400. The Land-Turtles laid eggs on our deck [13th of September]. Our men brought some from the shore about the Bigness of a goose egg, white, with a large big shell, exactly round. The creatures are the ugliest in Nature, the shell not unlike the top of an old hackney-coach, as black as jet, and so is the outside skin, but shriveled and very rough. The legs and neck are very long, and about the bigness of a man's wrist; and they have club-feet, as big as one's fist, shaped much like those of an elephant, with five thick nails on the fore-foot and but four behind, and the head little, and visage small like snakes, and look very old and bleak. When at first surprised they shrink their neck, head and legs under their shell. Two of our men, with Lieutenant Stratton and the trumpeter of the *Duchess*, affirm they saw vast large ones of

this sort, about four feet high. They mounted two men on the back of one of them, which, with its usual slow pace, carried them and never regarded the weight. They supposed this could not weigh less than 700 pounds. I do not affect giving Relations of strange creatures so frequently done by others; but when an uncommon creature falls in my way I cannot omit it. The Spaniards tell us, they know of none elsewhere in these Seas, but they are common in Brazil." [*T. tabulata* Wall.] Different islands were visited by Rogers. He continues, "I saw no sort of beast, but there are Guanos in abundance, and Land-Turtles almost on every island. It is strange how the latter got here, because they cannot come of themselves, and none of that sort are found on the main."

In 1720, Clipperton was for ten days on the island. Vancouver, who determined the position of some in 1795, did not go to land.

Colnet surveyed the Galapagos Islands in 1793, and published a survey of them. He says, p. 59: "The land tortoise was poor at this season, but made excellent broth. Their eggs are as large, and their shells as hard, as those of a goose, and form a perfect globe. Their nests are thrown up in a circular form, and never contain more than three eggs, which are heated by the sun, a hole being so contrived as to admit its rays through its daily course [!]. The shell is perfectly smooth, and when highly polished receives a beautiful and brilliant black."

One of the most accurate accounts of the tortoises has been given by Delano, who visited the Galapagos Islands at different times. He was a very good observer, and his notes must be considered as reliable.

"Delano went over all parts of the island and procured plenty of tortoises." On Charles Island "plenty of tortoises were to be obtained." Tortoises were also reported from James and Albemarle Islands. On pages 375-378 he gives a full account of these animals: "The terrapin, or, as it is sometimes called, the land tortoise, that is found here, is by far the largest, best, and most numerous of any place I have ever visited. Some of the largest weigh three or four hundred pounds, but their common

size is between fifty and one hundred pounds. Their shape is somewhat similar to our small land tortoise, which is found upon the island, and is like it, high and round in the back.⁷ They have a very long neck, which, together with their head, has a very disagreeable appearance, very much resembling a large serpent. I have seen them with necks between two and three feet long, and when they saw anything that was new to them, or met each other, they would raise their heads as high as they could, their necks being nearly vertical, and advance with their mouths wide open, appearing to be the most spiteful of any reptile whatever; sometimes two of them would come up to each other in that manner, so near as almost to touch, and stand in that position for two or three minutes, appearing so angry that their mouths, heads, and necks appeared to quiver with passion; when by the least touch of a stick against their necks or heads, they would sink back in an instant and draw their necks, heads and legs into their shells. This is the only quick motion I ever saw them perform. I was put in the same kind of fear that is felt at the sight or near approach of a snake at the first one I saw, which was very large. I was alone at the time, and he stretched himself as high as he could, opened his mouth, and advanced towards me. His body was raised more than a foot from the ground, his head turned forward in the manner of a snake in the act of biting, and raised two feet and a half above his body. I had a musket in my hand at the time, and when he advanced near enough to reach him with it, I held the muzzle out so that he hit his neck against it, at the touch of which he dropped himself upon the ground and instantly secured all his limbs within his shell. They are perfectly harmless, as much so as any animal I know of, notwithstanding their threatening appearance. They have no teeth, and of course cannot bite very hard. They take their food into their mouths by the assistance of the sharp edge of the upper and under jaw, which shut together one a little within the other, so as to nip grass, or any flowers, berries, or shrubbery, the only food they eat.

⁷ *Terrapene carolina* L., the common box-tortoise.

“Those who have seen the elephant have seen the exact resemblance of the leg and-foot of a terrapin. I have thought that I could discover some faint resemblance to that animal in sagacity. They are very prudent in taking care of themselves and their eggs, and in their manner of securing them in their nests ; and I have observed on board my own ship, as well as on others, that they can easily be taught to go to any place on the deck which may be fixed for them to be constantly kept in. The method to effect this is by whipping them with a small line when they are out of place, and to take them up and carry them to the place arranged for them, which being repeated a few times will bring them into the practice of going themselves, by being whipped when they are out of their place. They can be taught to eat on board a ship as well as sheep, or a goat, and will live for a long time if there is proper food provided for them. This I always took care to do when in a place where I could procure it. The most suitable to take on board a ship is prickly pear-trees, the trunk of which is a soft, pithy substance, of a sweetish taste, and full of juice. Sometimes I procured grass for them. Either of these being strewed on the quarter-deck, the pear-tree being cut fine, would immediately entice them to come from all parts of the deck to it ; and they would eat in their way as well as any domestic animal. I have known them live several months without food ; but they always in that case grow lighter and their fat diminishes, as common sense teaches, notwithstanding some writers have asserted the contrary. If food will fatten animals, to go without it will make them lean.

“I carried at one time from James Island three hundred very good terrapins to the island of Massa Fuero, and there landed more than one half of them, after having them sixty days on board my ship. Half of the number landed died as soon as they took food. This was owing to their stomachs having got so weak and out of tone that they could not digest it. As soon as they eat any grass after landing they would froth at the mouth, and appeared to be in a state of insanity, and died in the course of a day or two. This satisfied me that they were in some degree like other animals, and only differed from them by being slower in

their motions, and that it takes a longer time to produce an effect upon their system than upon that of other creatures. Those that survived the shock which was occasioned by this sudden transition from total abstinence to that of abundance, soon became tranquil, and appeared to be as healthy and as contented with the climate as when they were at their native place, and they would probably have lived as long had they not been killed for food. Their flesh, without exception, is of a sweet and pleasant a flavour as any that I ever ate. It was common to take out of one of them ten or twelve pounds of fat when they were opened, besides what was necessary to cook them with. This was as yellow as our best butter, and of a sweeter flavour than hog's lard. They are the slowest in their motions of any animal I ever saw except the sloth. They are remarkable for their strength; one of them would bear a man's weight on his back and walk with him. I have seen them at one or two other places only. One instance was those brought from Madagascar to the Isle of France, but they were far inferior in size, had longer legs, and were much more ugly in looks than those of the Galapagos Islands. I think I have likewise seen them at some of the Oriental Islands which I visited.

"I have been more particular in describing the terrapin than I otherwise should have been, had it not been for the many vague accounts given of it by some writers, and the incorrect statements made of the country in which it is to be found. The frequent political comparisons and allusions which have been made by our public papers and orators to this animal, may have led the people of this country into incorrect notions concerning them. It has been publicly said that terrapins are common to China, which I am confident is incorrect; for I have carried them to Canton at two different times, and every Chinese who came on board my ship was particularly curious in inspecting and asking questions about them, and not one, I am positive, had any knowledge of the animal before."

The most important of the other accounts is that given by Captain David Porter, who visited the Galapagos Islands, between 1812 and 1814 different times on the United States frigate *Essex*. He was the first one who noticed the difference of the tortoises on

the different islands. He likewise published the first figure of a Galapagos tortoise.

On Hood's Island he obtained land tortoises in great numbers, p. 127. In another visit he could not procure more than fifty tortoises, and they small, but "of a quality far superior to those found on James Island" (p. 233). In regard to Charles Island he says, it "abounds with tortoises, which frequent the springs for the sake of the water, and upwards of thirty of them were turned on their backs by us, as they came down to drink, during the short time we remained there, which was not more than an hour and a half. But we were enabled to bring down only one, and he was selected more for his antiquated appearance than for his size or supposed excellence. His weight was exactly one hundred and ninety-seven pounds, but he was far from being considered a large size. Later, between four and five hundred were taken on board. They were brought the distance of from three to four miles, through thorns and over sharp rocks, yet it was no uncommon thing for them to make three and four trips a day, each with tortoises weighing from fifty to a hundred weight." "Although the parties in this employment (which were selected every day, to give all an opportunity of going on shore), indulged themselves in the most ample manner on tortoise meat (which for them was called Galapagos mutton), yet their relish for this food did not seem in the least abated, nor their exertions to get them on board in the least relaxed, for everyone appeared desirous of securing as large a stock of this provision as possible for the cruise" (p. 162).

On James Island the tortoises must have been very numerous. Two vessels captured by Porter near that Island, "had been in at James Island, and had supplied themselves abundantly with these extraordinary animals, the tortoises of the Galapagos, which properly deserve the name of the elephant tortoise. Many of them were of a size to weigh upwards of three hundred weight." "Numbers of them had been thrown overboard by the crews of the vessels before their capture, to clear them for action. A few days afterwards, at daylight in the morning, we were so fortunate as to find ourselves surrounded by about fifty of them, which

were picked up and brought on board, as they had been lying in the same place where they had been thrown over, incapable of any exertion in that element, except that of stretching out their long necks." Two other English vessels captured later, "had been only a few days from James Island;" Porter "found on board them eight hundred tortoises of a very large size, and sufficient to furnish all the ships [with 333 men] with fresh provisions for one month." At another time Porter laid in a very large stock of tortoises from James Island. "Four boats were despatched every morning for this purpose, and returned at night, bringing with them from twenty to thirty each, averaging sixty pounds. In four days we had as many on board as would weigh about fourteen tons, which was as much as we could conveniently stow. They were piled up on the quarter-deck for a few days; with an awning spread over to shield them from the sun, which renders them very restless, in order that they might have time to discharge the contents of their stomachs; after which they were stowed away below, as you would stow any other provisions, and used as occasion required. No description of stock is so convenient for ships to take to sea as the tortoises of these islands. They require no provisions or water for a year, nor is any farther attention to them necessary, than that their shells should be preserved unbroken" (p. 214). "The most of those we took on board were found near a bay on the northeast part of the Island, about eighteen miles from the ship. Among the whole only three were male, which may be easily known by their great size, and from the length of their tails, which are much longer than those of the females. As the females were found in low sandy bottoms, and all without exception were full of eggs, of which generally from ten to fourteen were hard, it is presumable that they came down from the mountains for the express purpose of laying. This opinion seems strengthened by the circumstance of there being no male tortoises among them, the few we found having been taken a considerable distance up the mountains. One remarkable peculiarity in this animal is, that the blood is cold. I shall leave it to those better acquainted with natural

history to investigate the cause of a circumstance so extraordinary, my business is to state facts, not to reason from them.

"The temperature of the air of the Galapagos Islands varies from 72° to 75° ; that of the blood of the tortoise is always 62° " (p. 215).

No tortoises were taken by Porter on Albemarle, but he remarks (p. 142) that an English sailor, who had been landed there by his captain, existed near a year on land tortoises and guanos."

No landing was possible on Abingdon Island, but Porter had no doubt landing might have been effected elsewhere; and from the verdant appearance of the interior of the island he supposed that, like all others, it afforded tortoises.

On Chatham, where Porter stayed only a very short time, he did, not get any tortoises, but he "saw a few of their shells and bones; but they appeared to have been long dead." This remark relates only to these shells and bones he found, but not to the tortoises of Chatham in general.

Indefatigable Island, was surveyed by David T. Adams, the chaplain of the *Essex*, for the first time, and called Porter's Island. Adams informed Porter that land tortoises were in the greatest abundance, "of an enormous size, one of which measured five feet and a half long, four feet and a half wide, and three feet thick, and others were found by some of the seamen of larger size."

Porter has given the following general description of the Galapagos tortoises:

"Nothing, perhaps, can be more disagreeable or clumsy than they are in their external appearance. Their motion resembles strongly that of the elephant; their steps slow, regular and heavy, they carry their body about a foot from the ground, and their legs and feet bear no slight resemblance to the animal to which I have likened them; their neck is from eighteen inches to two feet in length, and very slender; their head is proportioned to it, and strongly resembles that of a serpent. But, hideous and disgusting as is their appearance, no animal can possibly afford a more wholesome, luscious, and delicate food than they do; the finest green-turtle is no more to compare to them in point of excellence than the coarsest beef is to the finest veal; and after once tasting

the Galapagos tortoises, every other animal food fell greatly in our estimation. These animals are so fat as to require neither butter nor lard to cook them, and their fat does not possess that cloying quality, common to that of most other animals. When fried out, it furnishes an oil superior in taste to that of the olive. The meat of this animal is the easiest of digestion, and a quantity of it exceeding that of any other food, can be eaten without experiencing the slightest inconvenience. But what seems the most extraordinary in this animal, is the length of time that it can exist without food; for I have been well assured that they have been piled away among the casks in the hold of a ship, where they have been kept eighteen months, and when killed at the expiration of that time, were found to have suffered no diminution in fatness or excellence. They carry with them a constant supply of water, in a bag at the root of the neck, which contains about two gallons; and on testing that found in those we killed on board, it proved perfectly fresh and sweet. They are very restless when exposed to the light and heat of the sun, but will lie in the dark from one year's end to the other without moving. In the daytime, they appear remarkably quick-sighted and timid, drawing their head into their shell on the slightest motion of any object; but they are entirely destitute of hearing, as the loudest noise, even the firing of a gun, does not seem to alarm them in the slightest degree, and at night or in the dark they appear perfectly blind." In regard to the bag of water, Porter gives another statement (p. 100.) He partly ascended a hill on Charles Island, and on his way back he found a large tortoise. It was opened, "with the hope of finding some water to allay our thirst. But we were disappointed—says he—in only finding a few gills, of a disagreeable-tasted liquid." The tortoises taken on James Island had in their stomach or reservoir from one to two gallons, of a "taste by no means disagreeable." It seems therefore that this "water reservoir" is not always filled. It was in August when Porter found the tortoises on James Island full of eggs. We have seen above that Woodes Rogers relates, that the tortoises laid eggs on his ship in September. It seems therefore that the breeding time is in these two months. According to Porter the eggs "are perfectly round,

white, and two and a half inches in diameter. They are far from being a delicacy when cooked, as they are dry, tasteless, and the yolk is little better than saw-dust in the mouth" (p. 216).

In regard to the difference of the tortoises from different Islands Porter makes the following remarks: "The shells of those of James Island are sometimes remarkably thin and easily broken, but more particularly so as they become advanced in age; when, whether owing to the injuries they receive from their repeated falls in ascending and descending the mountain, or from injuries received otherwise, or from the course of nature, their shells become very rough, and peel off in large scales, which renders them very thin and easily broken. Those of James Island appear to be a species entirely distinct from those of Hood's and Charles Islands. The form of the shell of the latter is elongated, turning up forward in the manner of a Spanish saddle, of a brown color and of considerable thickness. They are very disagreeable to the sight, but far superior to those of James Island in point of fatness, and their livers are considered the greatest delicacy. Those of James Island are round, plump, and black as ebony, some of them handsome to the eye, but their liver is black, hard when cooked, and the flesh altogether not so highly esteemed as the others" (pp. 214, 215). The tortoises of Hood's Island "were of a quality far superior to those found on James Island. They were similar in appearance to those of Charles Island, very fat and delicious" (p. 233).

After his cruise round the Galapagos Porter proceeded to the Marquesas Islands. On Madison Island he "distributed from his stock several young tortoises among the chiefs, and permitted a great many to escape into the bushes and among the grass" (Vol. II., p. 104.)

In 1825 Capt. Benjamin Morrell visited the Islands, having been there already in 1823 from the 3d of October to the 2d of December, during which time he took not less than about five thousand fur-seal skins. The tortoises, he says, "grow to even a greater size than that mentioned by Commodore Porter, as I have seen some that would weigh from six to eight hundred pounds. They are excellent food, and have no doubt saved the lives of

thousands of seamen employed in the whale-fishing in those seas, both Americans and Englishmen. I have known whale-ships to take from six to nine hundred of the smallest size of these tortoises on board when about leaving the islands for their cruising grounds ; thus providing themselves with provisions for six or eight months, and securing the men against the scurvy. I have had these animals on board my own vessels from five to six months without their once taking food or water ; and on killing them I have found more than a quart of sweet fresh water in the resceptacle which nature has furnished them for that purpose, while their flesh was in as good condition as when I first took them on board. They have been known to live on board of some of our whale-ships for fourteen months under similar circumstances, without any apparent diminution of health or weight." On his first visit Morrell took one hundred tortoises on board. On his second visit, Feb. 10-12, a terrible eruption on Narborough Island was observed. Two hundred and ninety-four tortoises, averaging about twenty-five pounds each, were taken on board. Morrell does not state from which special island the tortoises were taken. During his third visit, Oct. 27 to Nov. 10, 1825, Indefatigable Island was visited, and one hundred and eighty-seven tortoises secured.

Up to this time the Galapagos Islands had not been inhabited. Only an Irishman, called Patrick Watkins, lived for some time in 1809 on Charles Island. Captain Porter has given an account of this first resident. But it was not until 1832 that Charles Island was really colonized. T. N. Reynolds, the secretary of Commodore John Downes, who visited the Galapagos Islands on the United States frigate *Potomac* in September, 1833, has given the history of this colonization. J. Vilamil, a native of Louisiana, of the United States, but for many years a resident of Guayaquil, had this enterprise in view as long ago as the year 1811. Political circumstances prevented his fulfilling his wish. In 1831 he petitioned the Government of Ecuador, and a charter in due form was granted, conceding the possession of the islands and authorizing the establishment of a colony. "In January, 1832, Colonel Hernandez, with only twelve colonists, was despatched to take formal possession of Charles Island, and in April and June, settlers of both sexes followed the first. Vilamil in person, accompanied by

eighty colonists, arrived in October, and at once assumed his station as proprietor and governor of the island" (p. 469).

It is clear that the colonization of Charles Island was of the greatest influence on the fauna of the islands, especially on the tortoises. Buccaneers and whalers have done a good deal to reduce these animals, but the colony of 2300 people reduced the number of tortoises on Charles Island in a short time to such an extent that when three years later Darwin visited the island they were already obliged to go to other islands to procure tortoises. In 1832, when the *Potomac* visited Charles Island, tortoises were still abundant, for a great many were brought from the island to the ship by the crew (p. 547). The number of whale-ships reported at Charles Island from October 13th, 1832, to August 30th, 1833, was not less than thirty-one, according to Reynolds. If each of these whalers took only two hundred tortoises on board, in less than one year six thousand tortoises were taken from Charles Island alone. There is little doubt that about one hundred thousand tortoises were taken from the Galapagos Islands since their discovery.

1. DAMPIER, W. A Collection of Voyages in four volumes. 8°, London, 1729.

2. ROGERS, CAPTAIN WOODES. A Cruising Voyage round the World, begun in 1708 and finished in 1711. 8°, London, 1718.

3. COLNETT, CAPTAIN JAMES. A Voyage to the South Atlantic and round Cape Horn into the Pacific Ocean. 4°, London, 1798.

4. DELANO, AMASA. A Narrative of Voyages and Travels. 8°, Boston, 1817. Second edition, Boston, 1818.

5. PORTER, CAPTAIN DAVID. Journal of a Cruise made to the Pacific Ocean by Captain David Porter, in the United States frigate *Essex*, in the years 1812, 1813, 1814. Two volumes, Philadelphia, 1815. Second edition, two volumes, New York, 1822. Other edition, London, 1823 (in New Voyages and Travels, vol. 8).

6. HALL, CAPTAIN BASIL. Extracts from a Journal written on the coasts of Chili, Peru and Mexico, in the years 1820-21-22. Two vols., 8°, Edinburgh, 1824.

MORRELL, BENJAMIN. A narrative of four voyages to the South Sea and South Pacific Ocean, Indian and Antarctic Ocean, from 1822-1831. 8°, New York, 1832.

8. REYNOLDS, T. N. Voyage of the United States frigate *Potomac* under the command of Commodore John Downes, during the circumnavigation of the globe, in the years 1831, 1832, 1833, and 1834. New York, 1835.